Use of palm oil decanter cake as a new substrate for the production of bio-oil by vacuum pyrolysis

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ABSTRACT

The present study was carried out to investigate the potential of palm oil decanter cake (PDC) for bio-oil production at various temperatures by vacuum pyrolysis. PDC was first dried in oven at 105 °C for 24 h to remove moisture and ground to particle size of 0.85–2 mm. Pyrolysis experiments were carried out at 400, 450, 500, 550 and 600 °C, with heating rate of 15 °C/min. The highest yield of bio-oil (22.12 wt%) was obtained at pyrolysis temperature of 500 °C. The chemical characterization of bio-oil was studied using ^{1}H NMR, FTIR, CHNS analyzer and GC–MS. The other properties like pH, calorific value and thermal volatilization were also determined. The pH value recorded to be 6.38, which is found to be higher as compared to other bio-oils. The calorific value of PDC bio-oil found to be 36.79 MJ/kg, which is slightly lower than that of conventional liquid fuel such as gasoline and diesel fuel. However, the bio-oil obtained from PDC has better fuel characteristics than that of bio-oil derived from palm kernel shell (PKS).